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AN
INAUGURAL DISSERTATION

ON
CATARACT.

SUBMITTED TO THE EXAMINATION OF
THE
REV. J. ANDREWS, D.D. PROVOST,
(PRO TEMPORE)
THE
TRUSTEES, AND MEDICAL PROFESSORS
OF THE
UNIVERSITY OF PENNSYLVANIA,

ON THE FIFTH DAY OF JUNE, 1805;

FOR
THE DEGREE
OF
DOCTOR OF MEDICINE

BY ISAAC CLEAVER,

OF PHILADELPHIA;

HONORARY MEMBER OF THE PHILADELPHIA MEDICAL SOCIETY.

O loss of sight, of thee I most complain!
.....Oh worse than chains,
Dungeon or beggary, decrepit age!

MILTON.

PHILADELPHIA:

PRINTED FOR THE AUTHOR BY THOMAS T. STILES,
NO. 10, CYPRESS-ALLEY.

.....
1805.

TO PHILIP SYNG PHYSICK, M. D.

ONE OF THE SURGEONS

OF

THE PENNSYLVANIA HOSPITAL, &c.

THIS DISSERTATION

IS RESPECTFULLY INSCRIBED,

BY HIS FRIEND AND PUPIL,

I. CLEAVER.

.....With the year
Seasons return; but not to me returns
Day, or the sweet approach of ev'n or morn,
Or *sight* of vernal bloom, or summer's rose,
Or flocks, or herds, or human face divine :
But cloud instead, and ever-during dark
Surround me ! From the chearful ways of men
Cut off; and for the book of knowledge fair,
Presented with an universal blank
Of nature's works, to me expung'd and raz'd,
And wisdom at one entrance quite shut out !

PARADISE LOST.

A DISSERTATION
ON
CATARACT.

Non recito cuiquam, nisi amicis, idque coactus.

HORACE.

BEFORE the true nature of cataract was discovered, all theories of its cause were vague and contradictory; the method of cure often failed, and was always uncertain. Though the operation of couching, which has since risen to considerable eminence, was then practised, yet it could not be supposed to succeed at all times, when the parts acted on were unknown; it was like searching in the dark for a minute object, if found, the success could be imputed to accident only.

As the nature of the affected parts was unknown, all definitions of the complaint were more or less fallacious. At one time it was called “a

blindness arising from an opacity," supposed to exist in the vitreous humour. At another time the aqueous humour was said to be its seat; and it was thought to be produced by a deposition of earthy matter. Again, it was said to be owing to a membranous film of inspissated aqueous humour; but the situation of this film was not fixed either to the posterior or anterior chamber of the eye. It was besides, often confounded with other complaints of the eye. A palsy of the optic nerve has been called black cataract.

Within a few years great light has been shed on the subject, by carefully examining the anatomical structure of the eye, in its morbid and sound states. The disorder is now confined to the crystalline lens and its appendages; these only bearing marks of disease after death. Cataract may then be defined, an opacity of the crystalline lens or its capsule, whereby a transmission of the rays of light to the retina is prevented.

All premonitory symptoms are precarious; and none can be considered as necessary precursors of the disorder. A head ache, pain in the part and suffusion often precede, but as they

attend other complaints of the eye, they are not sure indications of the approach of this. Besides, cataract *often* comes on instantaneously, without any precursors; the patient from the best of sight becoming suddenly blind.

Cataract generally commences with a dimness of vision, called by patients, "weak sight;" they are unable to view minute objects with accustomed precision; distant objects are seen less clearly; they appear dim as if seen through a fog, or as if a gauze curtain intervened immediately before the eyes. When great exertions are used in viewing these objects, and the exertion is continued some time, the patient will be distressed with a dull pain in the back part of the orbit; this will gradually subside as his efforts to see are restrained. Another incipient symptom I have heard adduced by patients is, an apparent obliquity in the direction of objects, compared to viewing a stick in water. This symptom shews an alteration in the refraction of the rays of light passing the lens. The circumstance occurred, particularly, in a case that came within my observation; the lens was ex-

tracted, when it was found to contain a kind of serous fluid.

As the disorder advances the symptoms are aggravated; dimness of sight becomes more troublesome, and distant objects are seen with greater difficulty. The patient has perceptions of a thousand imaginary things floating in the air, as threads, hairs, flies, &c....he supposes motes on the cornea; this induces a continual rubbing of the eye to detach them, but with no avail. These false perceptions are no doubt owing to a partial opacity of the lens; while the transparent parts continue to transmit the rays of light, the opaque parts reflect them; this produces shadows on the retina correspondent in shape, to the opaque spots on the lens.

The complaint for the most part gradually progresses; the opaque spots increase in number, or in size, or perhaps both, as is known from the perceptions of the patient. On looking into the eye a spot is to be seen immediately behind the pupil; the patient's sight declines fast, until at last it is with the greatest difficulty he can re-

cognise the most brilliant colours; and sometimes no difference is evident between day and night.

Many circumstances of which we are not well aware, have great influence on the colour of cataracts. The most common colours are different grades of white. When the disorder has arrived at maturity (by which I would be understood, that stage in which vision is least perfect), its colour is mostly full white, or a light grey. Though cataracts are mostly of one of these colours, yet they are by no means confined to them. They are sometimes of the colour of amber. And we find the black cataract often spoken of by the ancients. Their ideas concerning its nature were, however, very confused. It was often confounded with gutta serena; and not occurring very often, its nature was little investigated. The imperfect accounts given of it by the ancients, and the rarity of its appearance has induced many of the moderns to deny its existence. Among this number appears to be Mr. Bell, who expressly declares, "that there is no foundation for any distinction," between gutta serena and black cataract. Other writers, of equal celebrity with Mr. Bell,

influenced by observation, espouse a contrary opinion.

Though the progress of the disorder is, for the most part, gradual and regular, yet there are cases in which, for a few weeks, it progressed very fast, then remained some time stationary, and afterwards blindness came on suddenly. And again, instances are not wanting in which it *remained* stationary, the patient enjoying a partial use of his eyes till death.

Pain is not a necessary concomitant, of the disorder; in some cases it occurs; perhaps only when the inflammatory action is excessive, or when the subjacent parts are in a diseased state.

All ages, and both sexes, are subject to cataract; but we are told it mostly occurs about the age of 40; at the time "the strife between the arterial and venous system ceases." Neither old age, nor infancy are exempt from it. I have seen a case in a lady of between 70 and 80 years of age: Dr. Physick had a case where the patient was quite young;* and St. Yves informs us of

* MSS Lectures.

one, that was congenial : It occurs oftener in old age than infancy.

The remote causes of cataract are almost innumerable. It sometimes comes on without any apparent cause, but mostly may be traced to some external violence ; even, injuries of the most trifling appearance often produce it. When there is no apparent cause, it is to be attributed to an internal source. The small pox may terminate in cataract, as is evident from its producing opacities in other transparent parts. I can readily suppose the measles, and in fact most inflammatory diseases, may have the like determination. Cataract from lues venerea, gout and scrophula, is mentioned as a common occurrence. The external causes that induce cataract, are all blows or strokes on the eye ; falls that produce concussion in the globe of the eye. The displacement of parts may be so great, that the powers of restoration cannot effect a cure. All the causes of ophthalmia, may at times produce cataract ; such as, 1st. Mechanical irritation, caused by sand &c. getting into the eye. 2nd. The disease of trichiasis, in which the hairs of the cilia are

inverted and rub against the eye. 3rd. Acrid substances getting access to the eye. 4th. Too long exercise of the eye. Hence parsons and studious men are often afflicted. Hence, also, the complaint is not uncommon among watch-makers. 5th. Cold. 6th. Heat. 7th. Excess of light. I have known several cases of cataract induced by excess of light, together with too much exercise of the eye. One case occurred in a taylor, who brought on his complaint by working at red uniform dresses. 8th. Repeated intoxication may produce it.

Having mentioned the remote causes of cataract, I proceed to the proximate cause. On this point the opinions of the old surgeons were as contradictory as they were erroneous. M. de St. Yves, an eminent writer of the beginning of the eighteenth century, expresses himself in the following words: "The first thing which happens in the formation of a cataract, from an internal cause, is the *thickening* and *viscosity* of the nutritious juices, that flow into the vessels of the membrane, which fixes the crystalline in the vitreous humour, and into the vessels of the crys-

talline. These juices by their viscosity, stop the channels through which they pass; then the nourishment necessary to preserve the tone and spring of these vessels cannot be duly supplied, the vessels which should convey it being obstructed; for which reason the fluids which arrive latterly, not finding free passage and room to circulate, they stagnate, grow acrid, and so ferment. There ensues a *total dissolution of all the substance of the crystalline, &c.*....This doctrine was exploded by succeeding Pathologists.

The fluids of the body have little effect in producing diseases; any change they may undergo may more properly be considered the *effect* of "wrong action" in the solids, than an exciting cause to that wrong action. The "*thickening and viscosity of the juices,*" having in the pathology of our times no determinate meaning, we may safely abandon the expression.

The proximate cause has been considered, "an obstruction in the vessels of the lens." This cannot be true, for the disorder consists in an obstruction; and cause and effect can never be identically the same. With more pro-

priety it might be said to be, a “specific mode of action” in the vessels of the lens or capsule; this action is probably the same as inflammation in other parts of the body. I infer this, from the degrees of consistence of the crystalline. It is sometimes hard and firm, other times of a cheese consistence, or that of a calve’s foot jelly; and it was before observed, that it is sometimes in a hydatid state.* In the first case no more occurs than in the adhesive stage of inflammation. The inflammation is relieved by the effusion of coagulating lymph. That an effusion of lymph will render a transparent part opaque, is seen in the disorder of opaque cornea, which is very analogous to cataract. Inflammation in other parts of the body exhibits the same appearances as in the two last mentioned states of this complaint. Authors, of undoubted veracity, inform us, that in ascites, and in hydrocele of the vaginal coat of the testis, the contents of the sac are often so thick and viscid, that they will not escape through the canula

* Perhaps when the lens is fluid, the opacity exists in the capsule; for the semi-transparency of water does not seem likely to prevent the transmission of the rays of light so much, as completely to obscure vision. In a case I saw, this occurred

used in tapping with the trocar; and we well know that the contents of these tumours are often clear serum. That these are the effects of inflammatory action is shewn to great certainty by Dr. Rush, in his medical enquiries and observations. Analogy between these tumours, and the state of the lens, in cataract, is not very trifling. Again, one mode in which inflammation relieves itself, is by the extravasation of serum; this is shewn to great advantage in the action of blisters on the skin.

A circumstance demanding some attention is, that in fluid cataracts there often remains no vestige of the lens, retaining its natural firmness. How shall we account for this? Is the "lens dissolved" by the serum thrown out between it and the capsule? or is it absorbed? I object to the first, because the diseased lens is very little larger than the sound one; which would not be the case if, to the crystalline matter of its natural size, there were added a quantity of water. May not the circumstance be accounted for, by supposing, that the vessels of the capsule, being inflamed, throw out serum between it and the lens; and that the water, pressing on the lens,

gives a stimulus to the absorbents, which, being roused into action, remove the body? That this is the case, I infer from the known effects of pressure on other parts: it causes even the hardest bone to be removed. Something analogous occurs in hydrocele; the testis is sometimes found much diminished in size, owing to the pressure of the encysted water. The only objection that can be urged to this explanation is, that *dissection has never shewn the lymphatics of the eye*. If the fact tend to prove any thing, it shews how finite all anatomical researches are; and that we should not deny the existence of any part or parts, which by induction we are led to believe in, merely because they cannot be traced by the dissecting knife, or rendered visible by our glasses. The opaque capsule, that remains after the operation of couching, often loses its opacity. Is not this a strong presumptive argument in favour of that membrane being supplied with lymphatics?

Additional arguments in support of this proximate cause, may be drawn from the remote causes, before enumerated. They all tend to produce inflammation; either directly by their imme-

diate application to the parts, or indirectly, by producing that disposition in the system, that renders it liable to take on inflammatory action, by exposure to ordinary stimuli.

The *great*, and as far as I know, the only objection offered to inflammation, as the proximate cause is, that the presence of vessels has never been noticed in the lens; but this I conceive no objection; the fact only shews that our anatomical researches are limited. Why should we withhold our assent, when we have the strongest reasons for founding our belief? It is admitted, that the capsule is supplied with vessels, and dissection shews, that the lens is connected to it, by numerous threads, or filaments; that these are vascular, cannot be doubted; for if not, the crystalline could not be nourished, which it must be if alive; and it is hardly possible, that an inanimate substance could be seated in such a tender organ as the eye, without producing bad effects. No one circumstance, in the animal œconomy justifies the supposition. Admitting then, the vascularity of these attachments, and that they carry a fluid for the nourishment of the crystalline, we have granted all we wish: for nothing more is

necessary to constitute inflammation, than “an increased action in the vessels,” and an escape of red blood into these serous ducts. That this can readily take place, is shewn from analogy with brutes. In them *injections* will pass, with no great difficulty, from the blood vessels of the eye, to the body of the crystalline lens. Indeed with a very fine injection, and great attention, even the vessels of the lens in the human eye have been filled.*

A variety of names has been given to cataract, to designate different forms arising from the colour, consistence, and degree of fixity, of the lens. These distinctions, as they lead to no difference of treatment are unnecessary. What perhaps is of some use, is a division of the disorder into true and membranous cataracts; the former includes all affections of the lens, the latter implies an opacity of the capsule. As a knowledge, a priori, of each of these species might have considerable influence on our plan of treatment; it is to be regretted, that the symptoms of neither are sufficiently prominent to determine, certainly, the species that exists. The following appearances are said to denote the membranous cataract.

* Bell's Surgery.

1st. Spots of opacity, appearing as if detached from the lens.

2nd. The opacity being situated near the pupil. These are by no means unerring symptoms. That they may appear to greater advantage as characteristics in pointing out the species of cataract, it has been proposed, by a writer in the *Medical and Physical Journal* (vol. 6. page 352.) to dilate the pupil, by dropping into the eye a solution of the extract of belladonna. How this would answer, I cannot determine.

Before the true nature of this disorder was discovered, it was often confounded with other complaints of the eye; some of which in fact bore so little resemblance to it, that they never could mislead an attentive practitioner. In every treatise, we find pages devoted to the consideration of gutta serena, opaque cornea, staphyloma, hypopion, &c. merely to shew their difference, from cataract. In the present day however, the nature of this disorder is too well known, to induce any fears, in the surgeon, of blending it with most of the others. The only two he can be mistaken in, are opaque cornea, and gutta serena.

From the former, cataract may easily be distinguished by attending to the situation of the speck. In doing this, the patient should be placed in a clear light, and his eye viewed sideways; in opaque cornea, the speck will be seen connected with that membrane, *anteriorly* to the iris; but in cataract, it is seated posteriorly to the iris, immediately behind the pupil.

Gutta serena is rather more difficult to be distinguished from cataract; in some cases it is nearly impossible. In the common grey cataract we may be satisfied, by the speck behind the pupil, and the mobility of the iris, when alternately exposed to light and darkness. In viewing the eye, however, some caution is necessary to be observed, that we may not be deceived; for, in a certain position of a patient, labouring under gutta serena, the rays of light are so reflected, as to give the appearance of a white speck; this deception may be avoided, by viewing the eye in a different direction. If but one eye be affected, the sound one should be kept closed, while subjecting the other to light and darkness; for the iris of the diseased one, will sometimes move by sympathy.

In black cataract the pupil retains nearly its natural colour. The alternate enlargement and diminution of the pupil is a pretty good criterion; as in gutta serena it remains of the same size in all degrees of light; but there are cases of cataract in which the iris is immoveable....perhaps on account of adhesions,* formed between the uvea and capsule of the lens. For the most part, in an unmixed cataract, the patient can distinguish between day and night, or point out the most brilliant colours: this is not the case when the optic nerve is affected. There is said to be a peculiar characteristic of black cataract, viz. the rays of light are not reflected from the crystalline in such manner as to form a picture of the surgeon's face, while examining the eye.

Having given a history of the complaint, considered its causes, and pointed out several of its peculiarities, I shall next proceed to the method of cure. Unhappily little is to be expected from the use of medicines, unless in recent cases. When it comes on suddenly, or is induced by mechanical violence, the antephlogistic plan will be of use. The vessels of the eye should be

* Does not this prove, previous inflammatory action?

freely emptied by general and local bleeding; cups and leeches might be applied to the temples, and after their action, a blister should be made to surround the lateral and under parts of the orbit; gentle laxatives may be exhibited, and the patient should use little exercise, keeping himself cool....a low diet should be strictly enjoined. Analogous to blistering is the production of inflammation on the globe of the eye. In the London Medical and Physical Journal, we have accounts of two cases,* in which cataract was removed by a spontaneous inflammation arising on the sclerotica. Whether a cure may at all times be effected by this means future experience must shew. Electricity has been used with success; and Buchan informs us, he has seen great benefit derived from a hemlock poultice to the eye. Of internal medicines, nothing bids fairer than the preparations of mercury, in small doses. Calomel, made into pills of two grains each, with conservus rosarum, may be given two or three times a day, till a gentle ptyalism is induced; this should be kept up for a few weeks....that it may not increase, one or two of the pills may be omit-

* Vol. 7. page 404....case by W. Crawfoot....Vol. 8. page 115....case by Mr. Morgan.

ted. The hyocyamus and flamula jovis have been recommended, with what advantage I am not informed. The latter is taken little notice of by our Materia Medica writers, though a medicine of some activity. I should not lay great stress on their exhibition. The chief dependence is to be placed on mercury; that this in some cases should effect a cure is not very extraordinary. It has been before shewn, that the system possesses the power of removing the opacity of the lens, or even the lens itself. This power is probably exerted through the medium of the absorbents; and we well know the power of mercury in stimulating this class of vessels.

It often happens that after our whole routine of medicines are expended, little impression is made on the disorder; it becomes fixed, and all our hopes rest in a surgical operation. Operations ought to be the *dernier resort* of every reflecting surgeon; they should be considered as proofs of the imperfection, rather than perfection of medical science; and not had resource to till other remedies had proved ineffectual. This remark can only apply to recent cases of cataract; for in those of long standing, little hopes are enter-

tained of a cure by medical means. At any rate, great caution should be observed in recommending an operation. A patient can never be indifferent of what will give him pain, and though operations for the most part terminate favourably, yet we can never answer for their success. Those of the most trifling nature sometimes fail. Besides, the reputation of a surgeon is often involved in his success, as an operator....When, therefore, an operation presents the only means of cure, before proposing it to the patient, the surgeon should revolve in his mind the chances of recovery, which is best done by considering the *unfavourable* circumstances of the case. These are such as depend on age, other diseases and seasons of the year; to which has been added, the state of the cataract as it regards maturity.

Infancy and old age, are justly considered as periods less favourable to the success of an operation, than middle life. The great irritability of infants, exposes them to many diseases from which adults are exempt. Were the operation to be performed with the greatest skill, yet great hazard would remain from inflammation, a disorder to which, their age particularly predisposes

them: but besides this, one great object to the surgeon, is the ease with which the operation may be performed. To avoid inconvenience requires great fixity of the eye, and stillness of the patient, which can never be expected from infants. In fact few *children* have sufficient presence of mind, to bear the operation with firmness. It is impossible to determine at what age, it may be performed with safety. The constitutions of children are so different, that no definite time can be fixed upon. As soon as it is thought he has acquired sufficient fortitude to bear it with composure, it may be attempted. I have seen an *artificial pupil* made for a boy of 14 years of age: probably an earlier period of life will often answer.

In old people, the process of restoration is slow, and often difficult. The most trivial sore is tardy in its cure, and frequently is attended with mortification. The same weakness of the powers of life obtains in the eye. Injuries done to it do not assume that healthy disposition, that we are to expect in young people. I have seen a cataract extracted from the eye of a lady aged 70: the cure of the injured parts was slow and tedious;

even the incised cornea did not heal as soon as usual: violent inflammation came on, though every means were used to prevent it; and till several weeks had elapsed it did not abate.

To ensure success to an operation it is of the utmost importance, to have the eye free from other complaints. Œdema of the eyelids and ophthalmia membranarum are very forbidding. Old people are often troubled with ophthalmia tarsi, which is an additional objection to operating on them.

Mr. Hunter informs us, that no new action can take place in the system, without the previous formation of a new disposition: every part that has a disposition to disease, upon receiving an injury, will be liable to take on that disease. That the process of restoration should be fitly performed, it is necessary that the injured parts should have no tendency to disease, or that this tendency, should first be counteracted. Mr. Hunter's theory will very properly regulate our line of conduct in cataract. It will teach us, before operating to resolve any "wrong action." The powers of life, will naturally produce a healthy

disposition. To this purpose, all inflammation or œdema should speedily be subdued, that the patient may be brought into a healthy state as soon as possible. The same directions are necessary, in any general disease of the system; the presence of inflammatory fevers, or even those of feeble action, syphilis &c. should be attended to.

Some people from habit, have certain peculiarities, that are rather unfavourable: such are, occasional vomiting, coughing, sneezing, &c. These subject the patient to a hazard of losing the vitreous humour of the eye; this loss must prove fatal to sight, as that humour never is restored. Dr. Physick relates a case in his lectures, where sneezing ruptured a blood vessel in the eye: a hemorrhage ensued, which did not stop till a coagulum of blood was formed: this extending between the divided edges of the cornea, prevented their union. The coagulum was not removed, lest the hemorrhage should again be excited; the eye suppurated, and the patient eventually lost his sight. Periodical, or continued pain in the head, militates against the operation: if it have no other ill consequences, it makes the patient restless; and it is essential to his recovery that he should be perfectly quiet.

Patients of nervous temperaments, who faint on every slight occasion, are bad subjects. Their minds should be supported by liquid. laudanum. This is one of the necessary evils in medicine. Though it often aggravates some particular symptoms, yet on the whole its advantages are such as to warrant its exhibition. This remark applies forcibly in cataract. Laudanum evidently increases arterial action, which it is a great desideratum to suppress ; but it prevents the risk of fainting, which would effectually stop the operation.

Cataract is occasionally complicated with gutta serena : here an operation would be useless. The presence of the latter may be known by the immobility of the iris, and complete blindness. Sometimes however, when the optic nerve is not affected, the iris is immoveable as has before been said : And slight vision, is not an infallible sign, that the nerve is not affected.

If we have a choice, some attention should be paid to the season of the year. No doubt, the operation would often succeed at any season, but to the spring and autumn preference is usually given. The cold of winter, and heat of sum-

mer, would make confinement very disagreeable to the patient. Further, in cold weather he is exposed to a chance of taking cold, on account of the unequable temperature of the room.

Much has been said, on the maturation of cataracts, The ancients, thought they could perceive some similarity between the disordered lens, and the kernels of fruit; hence, in the last stage of the complaint it was said to be ripe. Different stages were marked during the progress of the disorder, according with the degree of consistence of the lens. It was thought this body, at the commencement of the disorder, invariably became fluid....this was called the first stage. Such cataracts as were more firm, were said to belong to the second stage; and such as were hard were classed in the third stage, or said to be mature. These three stages were supposed to follow each other in regular succession.

This doctrine, fallacious in itself, led to a mode of practice that was wild and precarious. Retaining the analogy of fruits, in the mode of cure; it was thought, as fruit may more easily be detached from the tree when ripe, than green,

so mature cataracts allowed of a much easier cure than incipient ones. It was before observed, that the maturity of the cataract was to be judged of by its density. As no determinate symptoms were fixed on to denote its consistence, the proper time of operating was always ambiguous. In vain had they recourse to the colour of the lens; this often misled and was never certain. Under these circumstances it is hardly to be supposed the most intrepid surgeon would hazard an operation. This was not the case. Operations were frequent. And though the lens was often found in what was called an immature state; and though in that state the operation succeeded....yet so great was the bias of education, that the doctrine of maturation was still adhered to. Improvements in surgery, for the most part, go hand in hand with discoveries in anatomy. The latter is to the former what the chart is to the navigator. While any "terra incognita" remains in the human frame, we are not to expect perfection in the art of surgery. The sun of modern genius tends rapidly to dispel the glooms of uncertainty, in which our art has been heretofore invested. Medicine has become a science; our anatomical knowledge is increased....manual operations have

become intelligible, and are much simplified. Anatomy has done much in pointing out the true state of the crystalline; it shews us the doctrine of maturity was only hypothesis, or mere surmise.

The consistence of the lens cannot be considered as the effect of any general or invariable law; many lenses never become soft....others becoming changed remain fluid through the whole complaint. And again, we find others that are of a medium consistence, and unalterable. It is now clear that the term ripe, or unripe has, if any, a very obscure meaning. If it be thought necessary to retain the words Mr. Bell proposes, "that instead of being employed to signify the appearances of a cataract, they should be applied to express the effects produced by it. In this manner we might very properly say, that a cataract is ripe, when a patient is rendered entirely blind by it; and that on the contrary it is still in an unripe state, as long as vision is much impaired by it." With this definition they would be more expressive of the time proper for an operation. Possibly the operation would succeed at any intermediate time between the commence-

ment of the complaint and its termination in blindness; but as it is attended with *some* danger, it is not advised, while the patient can attend to his ordinary business, or while one eye remains sound.

When it is ascertained that the patient is of a proper age, that he is free from other complaints, that the season is favourable, and that the disease has progressed so far as just to admit of a distinction between light and darkness, or bright and dull colours....the operation may be advised. In operating, our object is to remove the opaque lens from the axis of vision, so as to give a free admission of the rays of light to the retina. This is effected in two ways, by a process called couching, and by extraction. The first consists in passing a needle through the tunica sclerotica, at about one-twelfth of an inch from its junction with the cornea behind the iris, so as to puncture the middle of the lens; this body is then pushed to the bottom of the eye where it is lodged under the vitreous humour. The operation of extraction consists in the removal of the crystalline lens from the eye, through a section of the cornea.

Much has been said in favour of both these operations, and great pains has been taken to point out a superiority of one over the other. By the testimony of respectable writers, both have often succeeded; probably in equally fair cases, if performed by operators of equal skill, either may answer the desired purpose. In surgery, as in affairs of less moment, we are too often actuated by prejudice. Every one will be apt to prefer that operation which he has seen oftenest succeed. Most surgeons have a partiality to one mode; by habit they become more dexterous, and invariably neglect the manner to which they have not been accustomed; this gives a bias to the student, who, for the most part, follows implicitly the precepts of his tutor. Hence, when there is two ways of operating, we can readily account for the decided preference given to one, while the other is neglected or decried, independently of considering the merits that each may possess.

Though no doubt, prejudice has had much to do in determining on the proper mode of operating for cataract, yet there are good reasons why extraction should be preferred. In deciding on

the superiority of one operation over another, three things should be considered.

1st. The pain and inconvenience, to which the patient is subjected.

2nd. The facility with which it may be performed. And

3rd. The chance of recovery it affords the patient.

These three circumstances I shall proceed to consider, as they concern the two operations of extraction and couching.

1st. Extraction is attended with very little pain, much less than couching. This is shewn by comparative operations. Persons, having cataracts in both eyes, have had one extracted and the other couched; they always declare, that the former operation is productive of least pain: Indeed this might be ascertained, a priori, by attending to the physiological nature of the parts acted on, by the respective operations. Nerves, the organs of sensation, for the most part, are distribu-

ted and ramify with the arteries; accordingly, parts possessing many vessels, seem to be proportionally sensible of impression, and vice versa. The vascularity of a part is evinced by its florid appearance: the cornea lucida is transparent or colourless; from which it follows, that violence to that membrane is attended with little pain. In fact it is nearly as insensible, as our nails; and its section in the operation, as it regards pain, is often compared by the patient, to paring those appendages of the body. Cutting the cornea is the only part of the operation that bears the least semblance to giving pain. In couching, membranes are perforated that are well supplied with blood vessels, as is shewn by the flow of blood that ensues; the pain must be considerable from this source. In clearing the axis of vision, the lens is forced below the vitreous humour, causing great displacement of parts; if it rises, the operation must be repeated: all this time, irritation is kept up in the wounded coats of the eye, by an extraneous substance, and irritation of that kind always gives more or less pain.

2nd. It was before observed, that cataracts having no unfavourable circumstances, may be

depressed with as great ease to the surgeon as extracted: but there are circumstances that forbid couching; and some of these cannot be discovered by the most careful prior examination. If an attempt to couch be made, the operator must either desist from his intentions, or proceed at the palpable risk of being foiled in success. No dilemma is more disagreeable than this: independent of the disappointment of the patient; the presence of bystanders, witnessing the failure of the operation, will give rise to very disagreeable sensations. Failures, whether unavoidable or the effect of awkwardness, are alike attributed, by lookers on, to want of skill. This should be a strong reason, to prefer an operation where any misfortune may be avoided. The circumstances alluded to are,

(a) A partial, or completely fluid state of the lens. In couching, the moment the capsule of the lens is punctured, the fluid parts escape into the aqueous humour, and renders it opaque: in extraction they are discharged from the eye with that humour. Mr. Pott has taken some pains to shew, that the turbid state of the aqueous humour is of no long continuance. From the

undoubted veracity of that celebrated man, we must believe this, at least so far as it concerns the cases that came within his immediate observation: but certain it is that the like occurrence does not, in all cases, take place: and why should we not preclude the possibility of it, when in our power? And that too by an operation, that is equally safe, easy and efficacious with couching, when performed, even under the most favourable circumstances.

(b) The capsule is often opaque as well as the lens: couching here can be of little service. It would be in vain to expect a restoration of sight by removing the crystalline, while an opacity still remained behind the pupil. The same objections obtain here as above: no symptoms indicate to a *certainty*, the presence of a diseased capsule: couching may fail; while no inconvenience occurs that will prevent the process of extraction. In the London Medical and Physical Journal, (vol. 9th. page 198.) we find a case, related by W. Simmons of Manchester, which was treated by cutting the capsule horizontally, with the edge of the couching needle: the cut-edges retracted, the lens was ^depressed and vision restored.

Would this mode of operating always succeed, it would remove the above stated objection ; but the happy termination is to be imputed more to accident, than an unerring occurrence. In a late European publication by a Mr. Hey, the operation by depression is warmly advocated. I regret my inability to procure Mr. Hey's book, as I am told he writes on the subject with great ingenuity. He informs us that a free laceration of the capsule is all that is necessary; and that the opaque fragments after a time, will be removed. This I humbly conceive not sufficiently valid to overthrow the support given to extraction. That the fragments of the lens, sometimes are removed, I have no doubt; but admitting that in a few instances this is not the case, have we not sufficient grounds for rejecting his advice?

(c) There are sometimes adhesions existing between the capsule and the lens, and uvea: such cases cannot be couched. In extraction these adhesions may be safely torn.

3rd. As the chief merits of every operation consist in its answering the desired purpose, it will not be amiss to inquire, how far couching

has that effect. That it is not always effectual in restoring sight is certain. The lens is prevented from regaining its natural situation by little else than its gravity, and some slight pressure of the vitreous humour; that these are insufficient to retain it, at the bottom of the eye, is shewn by cases where it actually has risen again; the consequence of which, is as complete loss of sight as before the operation. Indeed few cases of couching occur, in which the lens is fully depressed by one turn of the needle. This is sufficient to show how possible it is for the operation to fail. All that is necessary to reproduce the complaint, is any slight concussion of the eye that may produce motion in the vitreous humour. In answer to these objections it has been asserted, that the lens will be removed in a short time, which will prevent its rising again. That this sometimes is the case, I believe, but will not admit that it is a usual circumstance; for the most part, the patient is liable to the before-mentioned misfortune. It sometimes happens that the lens hangs loose in the posterior chamber of the eye, and whenever the patient stoops, falls upon the pupil and causes blindness. Extraction prevents these inconveniences. When a gutta serena is

produced, by an enlarged lens, pressing on the retina, if the complaint be recent, it will be removed by extracting the cataract. A cure could not be effected by couching. An incipient gutta serena often exists, without the surgeon being full aware of it before the operation.

The objections to extracting the lens are, for the most part trifling, and founded more on prejudice than observation. They are reducible to four:

1st. An opacity of the cornea, arising from the cicatrix of the wound, has been dreaded by some. That this does not often take place I am convinced by observation. If the section of the cornea be made with a sharp knife, and completed with one stroke, it is never to be apprehended. Sometimes, as when the iris and cornea are nearly in contact, it is necessary to use scissors; here as there is some contusion an opacity may occur; but this is of no consequence, as it is not before the pupil, and will not impede vision, which it is the object of the operation to restore. I have seen a semi-lunar section of the cornea, made with scissors, heal by the first intention, without opacity.

2nd. The passage of the lens through the pupil may give it an irregular shape, by tearing the iris....this can hardly be called an objection. It does not impede vision; besides the same occurs sometimes in couching. To prevent the risk of tearing the iris, Mr. Paget, recommends dropping a solution of extract of belladonna,* into the eye. By this means the pupil may be so enlarged as almost to obliterate the iris. A decoction of ^{*Stramonium*} ~~digitalis~~ has the same effect. Future experience must determine their efficacy.

3rd. The danger of wounding the iris.... this is easily prevented, as will be shewn hereafter.

4th. The vitreous humour may be lost; but this is owing to undue pressure made on the eye-ball the moment the section of the cornea is completed; pressure at that time is unnecessary, and should never be made. A small portion of the vitreous humour may be lost with impunity. On the whole, then, I conclude, that as

* Medical and Physical Journal, printed at London....Mr. Paget diffused four grains of the common extract in one drachm of water....six drops were poured into the eye.

extraction is less painful to the patient, performed with equal ease to the surgeon, and affords greater chances of removing blindness....it should at all times be preferred to couching.

Preparatory to the operation, several circumstances should be attended to; as inflammation is an alarming complaint, and one that is apt to supervene the operation for cataract, some caution should be observed, to prevent its approach: for this purpose the antephlogistic regimen should be entered upon, some time prior to the operation. A low diet should be strictly enjoined, a week or two previous. Bleeding, purging, &c. ought never to be neglected. A day or two before a blister is sometimes applied to the back of the neck; and the night before the operation, it is usual to exhibit a brisk purgative, to empty the large intestines, thereby preventing any inconvenience that would arise from going to stool. The time of day best suited to the operation is about noon. The room should be light, but have a northern aspect, so that the sun may not shine, directly into the windows. Such excess of light would dazzle the operator.

The instruments used on the occasion are.

1st. A knife made after the direction of Baron Wensel; its shape should be conical, or like a lancet, increasing gradually in breadth from the point to the handle, where it should equal the semi-diameter of the cornea. The conical shape gives it the properties of a wedge, in preventing the escape of the aqueous humour during the section of the cornea.... The knife should be thin, but yet sufficiently firm to bear any resistance made by the parts to be divided; the upper edge should be blunt to near the point, but the lower ought to be very keen. Great attention should be paid to the point, that it be well formed and sharp.

2nd. A needle a little curved at its point.

3nd. A little scoop made of silver.

4th. A small hook.

A few years ago a variety of instruments, called *specula oculi*, were brought into use for the purpose of keeping the eye steady. Modern surgeons of skill have laid these aside as useless.

If any should be thought necessary, the thimble with a projecting spear in the end, will probably be most useful. The principal objection to these instruments is, that they occupy one hand of the operator. The spear will give an additional injury to the eye, and render it more apt to take on inflammatory action. I have seen the common circular speculum applied to the healthy eye, with the effect of causing violent pain at the time, and subsequent inflammation.

The day of the operation the patient's mind should be kept calm, by assurances that the pain will be trifling, &c. The time of operating having arrived, he may be directed to put on such clothes as will suit him to wear during the whole of his confinement. He should next be seated on a low chair, with his affected side before a window. A bandage is applied to the forehead, having two depending strips attached to it, so that the eyes may be covered; the strip hanging over the affected eye is pinned up to the bandage. If the patient's hair be long before it should be cut, to prevent a chance of its getting into and irritating the eye after the operation.

His head is supported on the breast of an assistant placed behind ; whose business it is to raise the upper eye-lid ; in doing this, care must be taken, not to press *hard* on the globe of the eye : the skin of the palpebra is thrown into folds, and the tarsus pressed firmly against the frontal margin of the orbit. Some pressure is made on the globe of the eye to assist in keeping it fixed. The surgeon next seats himself on a stool, considerably higher than the chair of the patient : having depressed the lower lid with one hand, he takes the knife in the other, and proceeds to make the section of the cornea. A good operator should be able to use his right and left hand indiscriminately : but when this cannot be done, and it is not thought proper to decline the operation, the plan recommended by Mr. Bell, may be followed.* Having rested his hand on the cheek of the patient, the surgeon waits till the eye becomes steady and then applies the knife to the cornea, at about one-sixteenth of an inch from the sclerotic coat. The eye mostly recedes at first, but must be followed by the knife till it becomes fixed ; at that mo-

* Vide Bell's Surgery, vol. 3, page 443

ment the cornea is to be punctured, and the point of the knife carried through the eye till it passes the cornea at the inner canthus, when the assistant removes all pressure from the globe, and when the cornea is nearly divided he lets fall the upper lid: the incision of the cornea is then completed. It has been a matter of controversy to determine, whether the incision should be made on the upper or lower part of the cornea. No great advantages, to the patient, are to be expected from preferring either. As convenience to the surgeon, is a great object in all operations, it certainly is preferable to make it below. The greater facility of operating will do more than counterbalance any objections that may arise from supposed risks, of letting out the vitreous humour, opacity, disfiguration, &c.

The cornea should be always cut with one stroke of the knife; which is rendered easy by the particular width of the blade. After it has punctured the eye, it should never be drawn back; for if this be done *all* the aqueous humour will be apt to escape, which would be a great impediment to the operation. If by the mobility of the eye, this accident should occur, it would

be adviseable, to postpone the operation till the cornea heals, and the aqueous humour is restored. While cutting the cornea, owing to a partial loss of the aqueous humour, or other causes, the iris is apt to come forward and entangle the point of the knife; it may readily be made to recede, by gently rubbing the cornea with the end of the finger.

Some operators choose to puncture the capsule of the lens, while dividing the cornea, by dipping the point of the knife into the pupil, in its passage through the anterior chamber of the eye. This practice arose probably, more from a desire of shewing dexterity in the surgeon, than from necessity: the operation is much facilitated, by omitting it at this time.

Having divided the cornea, the eyelids should be closed, and the patient suffered to remain quiet a few minutes. In resuming the process, the lids should be gently raised, and the needle introduced into the eye; for the purpose of lacerating the capsule. In doing this, care must be taken not to injure the iris. The needle being withdrawn, the eye is again left at rest, that the pupil may dilate. The

surgeon, next raising the lid, makes gradual pressure on the eye, at the same time opening the wound of the cornea, with the scoop. In most cases the lens is easily expelled; but if this be not the case, it must be taken hold of with the hook, with which it may mostly be extracted. This done, the eye is again closed, and kept so some time. In expelling the cataract, the only caution necessary, is to guard against dislodging the vitreous humour; this accident may be prevented by regulating the pressure by the exigencies of the case. Moderate force is used in the first place.... gradually increasing it. Should the cataract give much resistance, it would always be prudent to have recourse to the hook. If the use of this be ineffectual, it is likely that the lens is retained by adhesions, existing between it, the capsule and uvea. The adhesions must be torn with a needle, taking care not to injure the iris. In many cases some escape of the vitreous humour, takes place without material disadvantage; but should circumstances be such as to endanger a total loss, it would be proper in every case, to desist from any further attempts, to complete the operation at that time.

Having removed from the eye the crystalline, if it only be affected, the pupil will be clear and free from any opacity whatever. But if the capsule should partake of the disorder; on examining the pupil it will be found clouded with white specks, fragments of the capsule. These are often discharged with ease, by letting the eye be closed, and pressing on the upper lid with the end of the finger, at the same time making a rotatory motion. If this should not discharge the specks, it will, at least, be useful in bringing them into the anterior chamber of the eye; or should they be hidden from sight, bringing them behind the pupil, whence they may be extracted with the scoop. In using this instrument, care must be taken, not to push it too far into the eye, lest the tunica hyaloidea might be ruptured, which would endanger the escape of the vitreous humour.

Should any prominent symptoms, certify a priori, an affection of the capsule, it would be proper to extract this first. To effect this, a small forceps is the most convenient instrument: with this the capsule is pinched up, and forcibly drawn out. It is advisable to extract the capsule before the lens in these cases, because it can readily be

laid hold of, while investing the lens. When divested of its capsule, the lens falls to the bottom of the eye : it may be removed by the hook.

When the pupil is clear of its opacities, it is usual to exhibit certain objects to the patient, to know if his sight be restored. These objects never should be luminous or brilliant. Watches, the hand &c. will answer every purpose, and even these should not be viewed long. The stimulus of light is too powerful to act, any time, on the eye, rendered more susceptible of impressions by disease.

For the most part, an inability to distinguish objects after the operation, is discouraging ; but it is not at all times to be considered a sign of failure. I have known a case, where the patient remained blind, several days after the lens was removed, and afterwards saw with the aid of proper glasses. In this case, the lens was a perfect hydatid, and much enlarged....its pressure on the optic nerve produced a temporary parallisis.

During the operation, none of the near relations of the patient should be present. Doctor

Physick, in his lectures, relates the case of a German, who had been blind five years. His wife stood by, while the lens was taking out, and was the first object he discovered. The emotion of joy was so great that he burst into a flood of tears. The bad effects of such an occurrence are too evident to be noticed.

Having completed the operation, the eye is closed ; a compress of soft linen applied to it ; the depending strip of the circular bandage is let down ; and the whole secured by a roller, passed round the head. The patient is put to bed, with orders to lie on his back, and remain as quiet as possible. His hands are tied to the bed sides, to prevent him rubbing his eye in his sleep....all light is excluded the apartment.

To guard against inflammation, the antephlogistic regimen is continued. His drink should be of a mild diluent nature, as toast and water, barley water, apple water, &c. While drinking, his head should never be raised from the pillow. A tea pot is a very convenient vessel, out of which to quench his thirst. In eight or ten days, the eye may be examined. If the pupil still conti-

nue clear, and he be conscious of an increase of sight, the prospect of a cure is great. When pain in the part, or general fever from inflammation supervenes, the same remedies are prescribed, as when they arise from other causes. The dressings must be removed every day, for they become stiff, by absorbing the moisture that escapes from the eye; if suffered to remain, they would cause irritation. In changing the dressings, it must be attended to, that nothing prevent the lips of the divided cornea coming in contact; the under eye-lid should always be pulled down; instances have occurred of its getting into the wound, and greatly retarding the cure. In a fortnight or three weeks, the dressings may be omitted, and in a short time, sight will be so restored, as to permit the patient to attend to his usual avocations.

FINIS.

